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Cancel claim 17

1. A method of watermarking a digital image, comprising the steps of:
transforming the digital image using a wavelet transform(WT);
transforming a watermark using discrete cosine transform(DCT); and
integrating the DCT-transformed watermark with the wavelet-transformed image to generate a watermark-embedded image.
2. The method of claim 1, comprising the step of inverse wavelet transforming the wavelet transformed image.
3. The method of claim 1, wherein the DCT-transformed watermark is further transformed using m -level wavelet transform before being integrated with the wavelet-transformed image.
4. The method of claim 3, wherein said wavelet transform is performed using a filter bank realizing high-speed wavelet-transform.
5. The method of claim 1, wherein said wavelet transform is performed using a filter bank realizing high-speed wavelet-transform.

watermark, a scaling parameter, α , is used to adjust the spacing between the original image and the watermark.

7. The method of claim 1, wherein the digital image and the watermark are black and white.
8. A system for watermarking a digital image comprising:
means for providing a digital image and a watermark, and
a digital processing system for transforming the digital image using wavelet transform(WT), transforming the watermark using discrete cosine transform (DCT) and integrating the DCT-transformed watermark with the wavelet-transformed image to generate a watermark-embedded image.
9. A system of claim 8, wherein the system includes means for carrying out digital watermarking a black and white image using the wavelet transform(WT) and the discrete cosine transform (DCT), wherein the watermark is black and white.
10. A system of claim 9, comprising means for providing an m-level wavelet transform (WT) before it is integrated wavelet transformed image.

discrete cosine transform (DCT) transforming a watermark,
wavelet transform (WT) a color image, and
integrating the DCT-transformed watermark with wavelet transform (WT) color
image

13. A method of claim 12, comprising the steps of:
converting the color image in the RGB mode, $RGB(x)$, into $Y(x)$, $I(x)$, and $Q(x)$
in the YIQ mode using a conversion matrix.
14. A method of claim 13, comprising the steps of:
transforming $Y(x)$ of the converted image using wavelet transform;
transforming a watermark, $W(y)$, using discrete cosine transform(DCT);
integrating the DCT-transformed watermark, $WC(y)$, with the wavelet-
transformed color image, $DW(x)$;
generating Y-values of the integrated image, $Y(x)'$, using inverse wavelet
transform; and
generating a watermark-embedded image in the RGB mode, $RGB(x)'$, by
inverse transformation of $Y(x)'$, $I(x)'$, and $Q(x)'$.
15. The method of claim 12, wherein the DCT-transformed watermark $WC(y)$ is
further transformed using m-level wavelet transform before being integrated with
the wavelet-transformed color image $DW(x)$.
16. The method of claim 12, wherein said wavelet transform is performed using
filter-banks realizing high-speed wavelet-transform.

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18. A system of digital watermarking a color image comprising:
means for providing a color image and a black and white watermark; and
a digital data processing means for digital watermarking the color image with the black and white watermark using wavelet transformation(WT) and discrete cosine transform (DCT).
19. A system according to Claim 18, comprising :
means for converting the color image in the RGB mode, $RGB(x)$, into $Y(x)$, $I(x)$, and $Q(x)$ in the YIQ mode using a conversion matrix;
means for transforming $Y(x)$ of the converted image using wavelet transform;
means for transforming the watermark in black and white, $W(y)$, using DCT;
means for integrating the DCT-transformed watermark, $WC(y)$, with the wavelet-transformed color image, $DW(x)$;
means for generating Y-values of the integrated image, $Y(x)'$, using inverse wavelet transform; and
means for generating a watermark-embedded image in the RGB mode, $RGB(x)'$, by inverse transformation of $Y(x)'$, $I(x)'$, and $Q(x)'$.
20. A system of digital watermarking a color image, comprising :
means for converting the color image in the RGB mode, $RGB(x)$, into $Y(x)$, $I(x)$, and $Q(x)$ in the YIQ mode using a conversion matrix;
means for transforming $Y(x)$ of the converted image using wavelet transform;
means for transforming a watermark, $W(y)$, using DCT;
means for further transforming the DCT-transformed watermark $WC(y)$ using m-level wavelet transform;
means for integrating the DCT-transformed watermark, $WC(y)$, with the wavelet-transformed color image, $DW(x)$;
means for generating Y-values of the integrated image, $Y(x)'$, using inverse wavelet transform; and
means for generating a watermark-embedded image in the RGB mode, $RGB(x)'$, by inverse transformation of $Y(x)'$, $I(x)'$, and $Q(x)'$.